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Reexamining the Relationship between Financial Development and Economic Growth: the case of South Africa.

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REEXAMINING THE RELATIONSHIP BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: THE CASE OF SOUTH AFRICA.

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This paper aims to analyze the causality relationship between financial development and economic development. The pairwise Granger causality test was applied to data of South Africa, from 1966 to 2008, under Vector Error Correction Mechanism. Empirical analysis reveals two major facts. Firstly, the economic growth Granger causes the financial development. Secondly, there exist long-run and short-run causality relationships from economic growth to bank assets. A boom of economic activities seems to be the driving force behind the improvement of financial sectors. Consequently, policies aiming to foster the financial sector in South Africa should include the nature of increased economic activities.

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INTRODUCTION

Financial development is as an efficient quantitative and qualitative betterment of financial services within an area (country, region, etc.) (Calderon,& Liu, 2003). However, no consensus on a unique type of relationship between financial development and economic growth seems to emerge from existing literature. Three main opinions can be distinguished from previous studies. Firstly, financial development impacts the economic growth, which is referred to as the supply leading hypothesis. This hypothesis assumes that more financial services would foster economic activities, allocate resources efficiently, and by the same token boost production. That implies that policies trying to augment the number of financial institutions and markets would increase the supply of financial services and thus promoting economic growth (Calderon, & Liu, 2003). Secondly, economic growth impacts financial development, which is referred to as the demand following hypothesis. This hypothesis assumes that a boom in economic activities would spark a need of financial services, and then easy the improvement of the financial system. It suggests that the increased demand of financial services due to an upward trend in economic activities is the important incentive behind the improvement of financial sectors (Fung, 2009). The last hypothesis assumes that there is a bi-directional interaction between financial development and economic growth. Calderon and Liu (2003) describe this hypothesis as a stage of development hypothesis. The latter posits that financial development can induce real capital formation in the early stages of economic development. "As financial and economic development proceed, the supply-leading

characteristics of financial development gradually diminish and are eventually dominated by demand following hypothesis" (p.2).

Calderon and Liu (2003) have applied the Geweke test to a set of countries to decompose the link between financial development and economic growth. They came up with a bidirectional link between financial development and economic growth, while suspecting a greater impact of financial development in most developing countries apart from from malaysia where economic growth drives financial development. The greater effect of financial development on economic growth in developing countries was confirmed by Dimitris and Ethymos (2004) who examined the case of 10 developing countries, and also realized that investment is the channel which allows financial development to boost economic growth. Luintel, Khan, Aristis, and Theodoris (2008) used pool data to examine the finance-growth nexus, and then found that the economic growth is impacted by not only the financial development, but by the financial structure as well. Alfaro, Chanda, Kalemi, and Sayek (2004) investigated the impact of financial markets on the relationship between Foreign Direct Investments (FDI) and economic growth. They realized that developed financial markets boost the impact of FDI on the economic growth. Michael (2009) observed some convergent countries, in terms of financial development and economic growth, and realized that the causality relationship from financial development to economic growth is stronger in the early stage of economic growth.

Few research have been dedicated to the relationship between financial development and economic growth of African countries (Haris, 2012) ,and most of them were subject to

inconsistencies due to misspecification bias, failure to take into consideration stationary property of data, and failure to check for efficiency of model specifications (Murinde, 2012).

Economic environment of South Africa is drastically changing since the end of Apartheid (Yalew, 2011). While most of African financial systems were classified as underdeveloped systems, South Africa was classified as Market Based system (Demirguc-Kunt and Levine 1997). Furthermore, the economic stability and its implications on other African economies make people to qualify South Africa as the power house of Africa (Kumar, 2009). Therefore, studying the relationship between financial development and economic growth of South Africa may give an idea of what is happening in other African countries where data are not available.

Using temporal data from South Africa on GDP, liquid liabilities, bank assets of deposit money bank, claims of deposit money banks on private sector, and claims of other financial institutions on private sector. We take first into consideration stationary property of the variables, and then we use the VECM model to check for both long-run and short-run relationship between the economic growth and financial development. Finally we use the ARCH heteroscedasticity test, the Breusch-Godfrey Serial Correlation LM Test, and the residual normality test to the efficiency of our VECM model.

Even if the causality from economic growth to financial development prevails, other variables, however, don't show that evidence. Fortunately, the efficiency tests applied on the unveiled relationship from economic growth to bank assets testify that the VECM model used was efficient.

Aiming to check for the prevailing type of relationship between financial development and economic growth, the rest of the paper is structured as followed: In the present chapter,

the following section presents theoretical considerations; another section presents the literature review, and then the last section focuses on South Africa and its financial system. The second chapter explains the methodology, describes data and then presents empirical outcomes of the paper. The last chapter concludes the paper and gives recommendations to policy makers.

Theoretical considerations

A financial system is composed of all bank and non-bank institutions striving to provide financial services. There are many stakeholders of financial systems such as providers of services, demanders, regulators, and policy makers. Commercial banks, insurance companies, mutual funds, finance companies, and investment banks are providers of financial services, potential investors and savers are demanders, and the central bank is the regulator and conductor of the monetary policy. Despite the existence of many financial services, their specific purpose may widely differ. Moreover, financial instruments are not only numerous, but also subject to innovations. Specifically, financial institutions want to satisfy better their customers and keep realizing profits on their operations. Therefore, demand for higher returns from savers and investors will stimulate a search for innovations that are profitable. The main mission of the financial system is to channel funds from savers to investors, and thus improves the efficiency of the economy (Mishkin, and Eakins, 2010). That mission is fulfilled through four core functions: mobilizing savings, allocating capital, monitoring the use of loans, and transforming risk by pooling and repackaging it (Goodhart, 2004). Therefore, financial development is the qualitative and quantitative improvement of the financial system (Calderon & Liu, 2003).

However, Zina and Trigui (1998) posit that financial development is not only related to the availability of financial intermediaries to allocate efficient savings, but it should also take into account the financial stability. Thus, the efficiency of a financial system increases the amount of resources required for the economic development. Thus, there exists a link from financial development to economic growth.

In fact, the qualitative and quantitative improvement of financial systems - financial development- should be measured through representatives variables which can capture the reality of the financial system. Many financial development proxies are used in the existent literature and they represent different aspects of the financial systems. Some can fit better specific financial systems than others. Specifically, indicators used in bank-based financial systems would be less reliable in market-based financial systems, mainly because of intrinsic differences between the two types of financial systems.

> "In bank-based financial systems like Germany and Japan, banks play a leading role in mobilizing savings, allocating capital, overseeing the investment decisions of corporate managers, and in providing risk management vehicles, while in market-based systems like England and the United States, securities markets share center stage with banks in terms of getting society's savings to firms, exerting corporate control, and easing risk management" (Demirguc - Kunt, & Levine, 1999, p.2).

Moreover, each indicator must belong to one of the three main categories - Indicator of size, indicator of activity and indicator of efficiency. Demirguc-Kunt and Levine (1999) suggested ten financial development indicators: liquid liabilities, bank assets, claims of deposit money banks on private sector, claims of other financial institutions on private sector, overhead costs, bank

net interest margin, the bank concentration index (national, foreign, and public bank shares), market capitalization as a share of GDP, total value traded as a share of GDP, and the turnover ratio.

Literature review

Many studies have been conducted on the linkage between financial development and economic growth. Different methodologies and datasets were used, and the conclusions were very different. We observe three strands of thoughts: Simultaneous and concurrent asymmetric links from financial development to Economic growth and from economic growth to financial development. Calderon and Liu (2003) used the Geweke test to decompose the link between the two main variables – financial development and economic growth. Credits issued to private sector were used to capture the financial development, while the change in Gross Domestic per capita (GDP) was used to represent the economic growth. Application of the Geweke test to a set of countries, from 1960 to 1994, revealed the existence of a bidirectional link between financial development and economic growth. Moreover, while recognizing that the contribution of financial deepening to the economic growth may be greater in developing countries than in developed countries, it may also take time for a real economy to be impacted by financial deepening.

Commercial bank assets, as a percentage of total assets in the financial system, were used in addition to the weight of private credits (Calderon and Liu, 2003) as proxies of financial development by James and Warwick (2007). Principal component analysis method was used to construct a unique composite measure, and then studied not only the linkage between financial development, but also the impact of financial repression on that link. Based upon time series

data from 1960 to 2001 of Malaysia, the empirical evidence suggests that although financial sector reforms have increased the size of the financial system, these policy changes do not appear to have led to higher long-run growth. Instead, financial deepening is an outcome of the growth process in Malaysia. Their paper confirms that for countries where financial repression works positively on financial development, the finance-growth nexus is likely to be a bi-directional one. On the other hand, if financial repression is harmful for the development in the financial system, then a finance-led growth seems unlikely.

Likewise Chalderon and Liu (2003), Dimitris and Ethymios (2004) observe the long run relationship of financial development and economic growth. They took into account the integration and cointegration properties of data to avoid spurious regressions (Gujarati,2011). Furthermore, they used total bank deposits liabilities as a percentage of GDP to capture financial development, and they assumed that the investment through the Gross Fixed Capital Formation (GFCF) is the channel which allows financial sector to impact the output. Thus, a better financial system would bolster savings, and boost the investment, and later impact the output. In addition, they used threshold co-integration tests and dynamic panel data estimation for a panel-based vector error correction model. The long run relationship was estimated using fully modified OLS. For 10 developing countries, the empirical results provide clear support for the hypothesis that there is a single equilibrium relation between financial depth, growth and ancillary variables, and the only cointegrating relation implies unidirectional causality from financial depth to growth. Their findings confirm predictions of Calderon and Liu (2003) related to developing countries.

Luintel, Khan, Arestis, and Theodoridis (2008) examined the impact of financial sector on the economic growth. Financial sector was not captured only by financial development proxies like did other authors, but also by financial structure proxies. Market capitalization of the stock market as a percentage of private credit were used to represent financial structure, while private credits ratio multiplied by stock markets value added ratio and private credit ratio plus stock market value traded ratio were used to represent financial development. Using Fully Modified Ordinary Least Square (FMOLS) method, they showed that both financial development and financial structure had impacts on the economic growth.

Alfaro, Chanda, Kalemli, and Sayek (2004) assumed that a better financial system would reduce the cost of external finance to firms, thereby promoting economic activities. Therefore, they investigated the relationship between foreign direct investments (FDI), financial markets and the economic growth. They examined whether the impact of foreign direct investment depends on the quality and quantity of financial services. To represent the financial system, many proxies were used in this research: liquid liabilities of financial system, the ratio of commercial bank assets to the summation of commercial bank and central bank assets, the ratio of credit by financial intermediaries to private sector to the GDP, the ratio of credit by deposit money to private sector to the GDP, and the stock market liquidity. After giving consideration to the openness of a country in the model, they concluded that developed financial markets boost the impact of FDI on the economic growth.

Michael (2009) wanted to see the convergence of countries by taking into consideration the interaction between real and financial sectors. Results from traditional convergence tests show that middle and high-income countries converge to parallel growth paths not only in per-

capita GDP, but also in financial development as well. The mutually reinforcing relationship between financial development and economic growth is stronger in the early stage of economic development, and this relationship diminishes as sustained economic growth gets under way. Thus, low-income countries with a relatively well-developed financial sector are more likely to catch up to their middle- and high-income counterparts. However, those with a relatively under-developed financial sector are more likely to be trapped in poverty. This finding explains the observed ‘‘great divergence’’ between poor and rich countries. Another finding is that, while human capital is more important to growth in the early stage of economic development, economic freedom becomes more important in the later stage.

A survey revealed that there exist a small literature that deals with financial development and economic growth in African countries (Haris, 2012). Anderson, Jones, and Trap (2012), and Gries, Kraft, and Meirrieks (2009) have tried to interact financial development respectively with financial liberalization and openness to see whether they were channels by which financial development was impacting the economic growth. Their studies revealed that none of them was used as a channel to impact the economic growth. To explain these inconsistencies, Murinde (2012) distinguishes several potential reasons: misspecification bias , failure to take into consideration the stationary property of data, and failure to check for efficiency of model specifications.

Therefore, more research on African countries are needed to have a better understanding of the finance-growth nexus in that part of the world, and this research will yield very important recommendation .This paper examines the relationship between financial development and economic growth of an important growth center country, South Africa, while

taking into account stationary characteristic of data, and by checking for efficiency of the VECM model used. It tries to capture the impact between financial development and economic growth by observing the relationship at two levels. At the individual level, the paper checks for direction of causality between economic growth and each financial development proxy, while in more general level it analyzes the type of causality between the economic growth and composite variables, representing reality of the all financial sector.

South Africa and the Financial System

The South African financial system had been growing since early 1800, after the mining boom. It has the second oldest stock exchange on the continent behind Egypt. Therefore, based on the supply leading hypothesis, it would be expected to have one of the highest economic growth rates in South Africa (Gondo, 2009).

According to a report of Absa bank (2006), dynamic changes in the South African banking environment have been taking place lately. Right after the end of apartheid, a period of consolidation started from the mergers of various banks, including Allied, United and Volkskas to form Absa bank in 1991. The latter is one of the "big four" consumer banks in South Africa. It offers a range of banking solutions including wealth management, investment management, retail and commercial banking, finance and insurance. Moreover, the promulgation of the bank act in 1990 initiated the increase of banking licences. After 1994, the entry of numerous foreign controlled banks and their representatives were noticed. As a consequence of this dynamism, almost 43 banks were registered by 2002. The entry of many foreign groups in the sector enabled the country to appease the Saambou bank crisis which slowed the trend around 2001/2002.

> "Saambou's "death" left the media bewildered, clients confused and worried about their savings and larger financial institutions waiting in the wings to make a "quick kill." When clients rushed to withdraw money after negative media coverage, Saambou could not honor its obligations on the short term due to cash-flow problems, although the Bank was financially quite sound. The Registrar of Banks finally placed Saambou under curatorship and it was eventually divided in sections and sold off to the best bidders" (Steyn , Beer , Steyn , and Schreiner, 2004, p.76).

Accordingly, the banking sector had undergone a period of substantial change and volatility; it has been attracting not only foreign groups, but also small banks. And the resulting competition targeted also previously unbanked and under banked communities. Another dimension of the competition is the entry of some non-bank companies in the sector such as retailers, cellphone companies and insurance companies which are increasingly offering financial services that were previously provided only by banks**.**

However, Demirguc-Kunt and Levine (1997) computed ratios of banking sector development relative to stock market development and ended up with three categories of financial systems: underdeveloped systems, bank-based systems and market-based systems. According to their classifications, South Africa financial system was classified as a Market based one, but its stocks markets are relatively small.

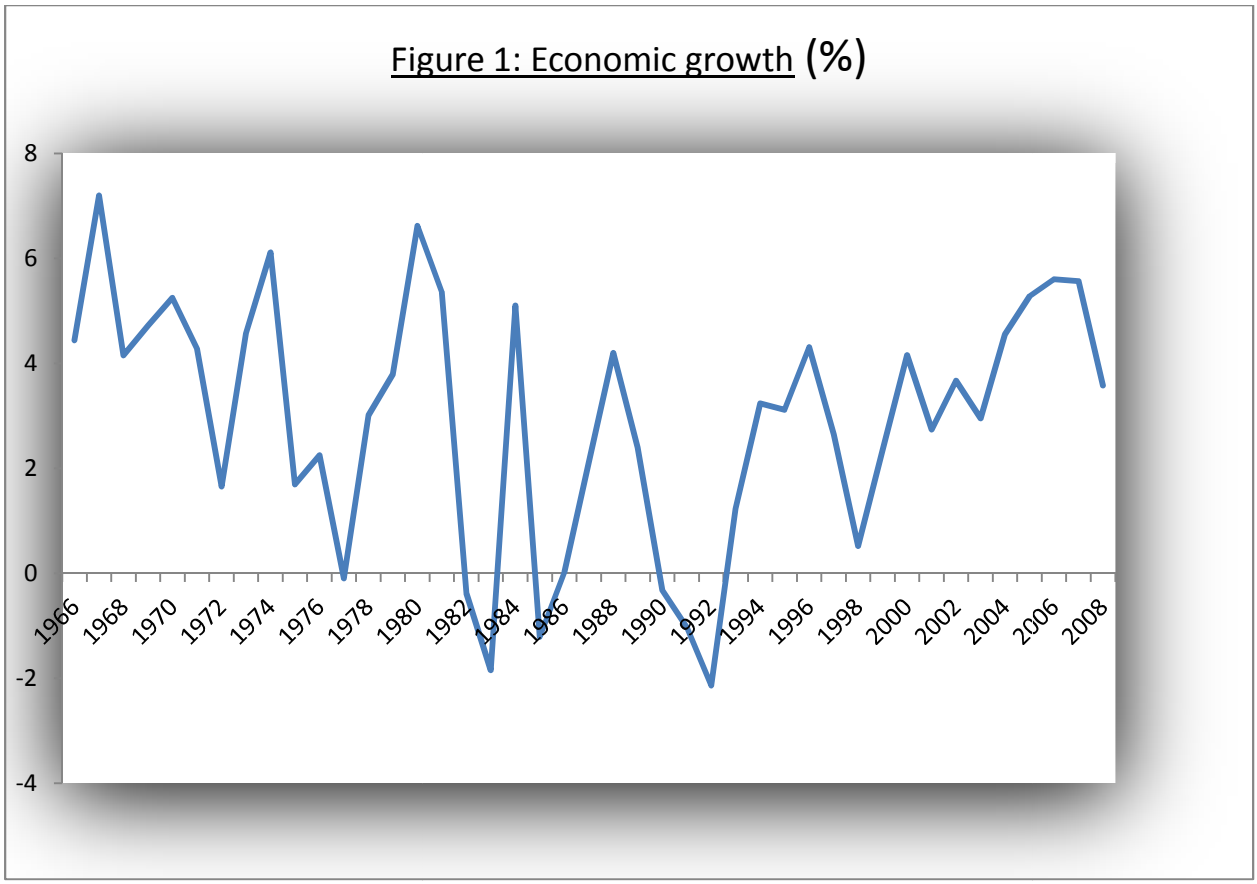
Table 1: Economic and financial Indicators (Averages)

Series Name	66 - 75	76 - 85	86 - 95	96 - 08
Final consumption expenditure, etc. (% of GDP)	72.79	69.49	77.32	81.51
Gross fixed capital formation (% of GDP)	24.42	26.27	17.48	16.88
Inflation, GDP deflator (annual %)	8.61	14.21	14.28	7.62
GDP growth (annual %)	4.41	2.26	1.28	3.69
Gov final consumption expenditure (% of GDP)	12.63	16.04	19.38	18.97
GDP per capita, PPP (constant 2000 international $)	3086.02	3361.10	3073.20	3233.36
LLGDP (DF1)[1]	0.57	0.53	0.53	1.08
CBAGDP(DF2)[2]	0.03	0.03	0.04	0.15
PCRDBGDP(DF3)[3]	0.46	0.45	0.52	0.76
PCRDBOFGDP(DF4)[4]	0.63	0.58	0.79	1.38

Source: World Development Indicators (2011), and Financial World bank database constructed by Beck and Demirgüç-Kunt (2010).

South Africa was under political unrest for approximately two decades: from 1970 to 1994 . During that period, many economic activities declined. The economic growth rate jumped from negative value before 1994 to an average of 3.6 % after. As shown in Graph 1, however, the growth is characterized by fluctuations. Furthermore, the structure of economic activities is drastically changing since the end of the apartheid (Yalew, 2011). As an example, private investments are increasing while government investments are decreasing, even if the total investment is still low: approximately 17% of the GDP (Stan and Ben, 2007). Among main contributors to the GDP are the mining and the service sector.

[1] Liquid liabilities/GDP
[2] Bank assets of deposit money bank/GDP
[3] Claims of deposit Money banks on private sector/GDP
[4] Claims of other financial institutions on private sector/GDP



Source: World Development Indicators (2011)

Additionally, the economic growth rate of South Africa has been positive since the end of the apartheid (1994), even if some decreases occurred from 1996 to 1998, from 2000 to 2001, from 2002 to 2003, and from 2007 to 2008. The high level of overall economic growth in South Africa, compared to others African countries is due to higher productivity and mostly to a relative safe business environment after the apartheid. Therefore, investors are attracted to South Africa and are creating jobs, even if the informal sector employs a large number of workers (Kingdon and Knight, 2004). Moreover, the government expenses increased from approximately 10% of the GDP in the 1960s to almost 18 % after 1994. It can also be observed from Table 1 that the Gross Fixed Capital Formation (GFCF) is decreasing. The rate of inflation is lower in the last period, while the GDP growth is higher than the two preceding periods. The

trend of financial indicators is unanimous: an upward trend is observed for all financial development proxies, even if *liquid liabilities* and *bank assets* evidenced a relative stability during the two middle periods - 1976-85 and 1986-95. Furthermore, stability of the South African economy and its implication on economies of other African countries made some people to qualify South Africa as the power house of Africa (Kumar, 2009).

A better understanding of the relationship between financial development and economic growth in South Africa would allow not only policy makers of south Africa to design an optimal policy but would also help other countries in that region to apprise the role played by financial development in their efforts to improve their citizens' life quality.

CHAPTER 2

METHODOLOGY, DATA, AND EMPIRICAL RESULTS

Methodology

Researchers employed various methods to study the relationship between financial development and economic growth. Likewise the paper written by Dimitris and Efthymios (2004), this paper applies as well the Ordinary Least Square method to estimate equation (1).

$$\boldsymbol{Yt = \alpha b + \sum_{i=1}^{p} \beta i * FD + \sum_{j=1}^{q} \delta j * Xj + \gamma D1 + Ut} \qquad \textbf{(1)}$$

Where Y stands for the GDP per capita, FD for financial development indicators, X for control variables, D_1 is a dummy variable related to a before-after analysis with the end year of apartheid being the limit year -1994- (D_1=0 until 1994, and D_1=1 after 1994) , and U for the error term. The index p represents the number of financial development proxies, while q is the number of control variables. To avoid ending up with a spurious regression, we have checked for stationary property of variables, and then used logarithm values as shown in equation (2) where L stands for logarithm.

$$\boldsymbol{L(Yt) = \alpha + \sum_{i=1}^{p} \beta i * L(FDi) + \sum_{j=1}^{q} \delta j * L(Xj) + \gamma D1 + Ut} \qquad \textbf{(2)}$$

Two co-integration tests were used verify long-run relationship between variables: the Granger test(Granger, 1981) and the Johansen test(Johansen, 1988).However, The Johansen test of cointegration has an advantage on the Engel-Granger test because it can allow more than one cointegration relation among a group of more than two variables (Davidson, and Mackinnon, 2004).

However, to check for the direction of the linkage between financial development and the economic growth, we have used Granger test of causality between the GDP per capita and each financial proxy. Related equations are presented as follow:

$$LY_t = \sum_{i=1}^{p} \alpha_i LY_{t-i} + \sum_{i=1}^{q} \beta_i LFD_{t-i} + u_{1t} \quad (3)$$

$$LFD_t = \sum_{i=1}^{r} \gamma_i LFD_{t-i} + \sum_{i=1}^{s} \lambda_i LY_{t-i} + u_{2t} \quad (4)$$

From equation (3) the null hypothesis would be $\beta_i = 0$, meaning that financial development does not Granger cause economic growth. $\lambda_i = 0$ is the null hypothesis of equation (4), which means that economic growth does not Granger cause financial development. Values of p, q, r and s are determined through an iterative process combining many criteria, searching for a model with low values of Akaike, Schwarz (Gujarati, 2011),and Hannan Quinn information criterion, of the final predictor error, and by using the sequential modified Likelihood Ratio (LR) test statistic (Weiybach, Walter, 2010) .

Seeking a better perception of the kind of relationship existing between the overall financial development and economic growth, the Principal Component Analysis (PCA) method was used to define an additional variable (Comp) which could capture reality of the overall financial development. The Granger causality test was also applied between economic growth and the constructed variable, using following equations:

$$LY_t = \sum_{i=1}^{p} \alpha_i LY_{t-i} + \sum_{i=1}^{q} \delta_i Comp_{t-i} + v_{1t} \quad (5)$$

$$Comp_t = \sum_{i=1}^{r} \gamma_i Comp_{t-i} + \sum_{i=1}^{s} \pi_i LY_{t-i} + v_{2t} \quad (6)$$

Likewise for equation (3) and (4), null hypothesis were $\boldsymbol{\delta_i = 0}$ for equation (5) and $\boldsymbol{\pi_i = 0}$ for equation (6).

In fact, whenever there is a cointegration relationship between the GDP per capita and a given financial proxy, the Granger test is applied through the Vector Error Correction Mechanism (VECM) (Kintambo, 2005). The error correction term is then brought into the picture leading to following equations:

$$\Delta LY_t = C + \sum_{i=1}^{p} \alpha_i \Delta LY_{t-i} + \sum_{i=1}^{q} \beta_i \Delta LFD_{t-i} + \delta_1 U_{t-1} + v_{1t} \quad (7)$$

$$\Delta LFD_t = C + \sum_{i=1}^{r} \gamma_i \Delta LFD_{t-i} + \sum_{i=1}^{s} \lambda_i \Delta LY_{t-i} + \delta_2 U_{t-1} + v_{2t} \quad (8)$$

Where Δ represents the differentiation, U_{t-1} is the error correction term, and the corresponding coefficient (δ_1 and δ_2) reflect the long-run causality, while β_i and λ_i give information on the short-run causality (Persan, Shin, and Smith, 2000).

Based on the Wald statistic test, from equation (7) the null hypothesis would be $\beta_1 = \beta_2 = \ldots = \beta_q = 0$, meaning that financial development does not Granger cause economic growth in the short run. Similarly, $\lambda_1 = \lambda_2 = \ldots = \lambda_s = 0$ is the null hypothesis of equation (8), which means that economic growth does not Granger cause financial development in the short run. Coefficients δ_1 and δ_2 stand for long-run relationship between financial development and economic growth. If $\boldsymbol{\delta_1}$ and $\boldsymbol{\delta_2}$ are non-zero, there is long run causality respectively from financial development to economic growth and from economic growth to financial development.

Efficiency and specification quality of the VECM model is checked through three tests: the ARCH heteroscedasticity test (Robin, Lumsdaine, Serena, 1999), the Breusch-Godfrey Serial Correlation LM Test, and the residual normality test (Bruggemann, Lutkepohl, Saikkonen, 2006). A desirable model should have no ARCH effect, no serial correlation and its residual term should be normally distributed.

Empirical studies of the explained methodology are based on data retrieved from various sources. The next section focuses on characteristics of data and empirical results.

Data and empirical outcomes

Due to availability of data, this paper focuses on annual data from South Africa for the period from 1966 to 2008. Four types of variables are included in this paper: economic performance variables, financial development variables, constructed principal component variables, and a dummy variable.

Economic activities are captured by the Gross Domestic Product (GDP) per capita. Government expenditures (GOV) and Gross Fixed Capital Formation (GFCF) are used as control variables. Government expenditure represents macroeconomic stability (Calderon& Liu, 2003), and GFCF which is mostly financed by savings constitutes a major driver of the production within the economy.

Table 2:Descriptive statistics of variables

	Mean	Std Dev.	Skew	Kurt	Jq-Bera	Pr	Obs(n)
GDPCAP_PPP2000_	3191.55	224.95	0.57	3.16	2.35	0.31	43
GFCF	20.96	4.67	0.17	1.64	3.5	0.17	43
GOV	16.91	2.83	-0.67	1.98	5.04	0.08	43
LLGDP(DF1)	0.7	0.26	0.84	1.96	7.05	0.03	43
CBAGDP(DF2)	0.07	0.07	1.42	3.94	16.12	0	43
PCRDBGDP(DF3)	0.56	0.16	1.85	6.53	46.92	0	43
PCRDBOFGDP(DF4)	0.89	0.38	1.13	3.35	9.34	0.01	43

GDPCAP: Gross Domestic Product per Capita; **GFCF**: Gross Fixed Capital Formation; **LLGDP**: Liquid liabilities/GDP; **CBAGDP**: Bank assets of deposit money bank/GDP; **PCRDBGDP**: Claims of deposit Money banks on private sector/GDP; **PCRDBOFGDP**: Claims of other financial institutions on private sector/GDP; **GOV**: Government expenditure/GDP; **GFCF**: Gross Fixed capital Formation.

As shown in Table 2, none of variables has a skewness coefficient equal to 0. Some Kurtosis values are close to 3, but the probability of most of them to get a Jarque - Bera value of

0 is too low. That probability is greater than any given level of significance (0%, 5%, 10%) only for the GDP per capita and for GFCF. Therefore, we can be tempted to conclude that these two variables are following the normal distribution

From financial development proxies listed by Levine and Demirgüç (1999), only four have observed values during the entire time span: Liquid liabilities, bank assets, claims of deposit money banks on private sector, and claims of other financial institutions on private sector. All of them are expressed in term of percentage of the GDP.

Liquid liabilities equals to the ratio of liquid liabilities of bank and non-bank financial intermediaries to GDP. It is used as a measure of the size of financial intermediaries compared to the size of the economy, and usually used as an indicator of the overall financial system. *Bank assets* is the ratio of the total domestic assets of deposit money banks divided by the GDP. It provides the weight of the banking sector within the economy. *Claims of Deposit Money Banks on Private Sector* expresses deposit money bank credit to private sector as a share of GDP. This indicator does not take into account credits to the public sector, and intends to grab the values of banks activities in the private sector. *Claims of Other Financial Institutions on Private Sector* is the share of credits (and other claims) issued by non-bank institutions to privates in the GDP. While capturing activities of non-bank institutions in the private sector, it is composed of insurance companies, finance companies, mutual funds, savings banks, private pension funds, and development banks.

Table 3 : Principal Component Analysis[5]

Rotation: (unrotated=principal)

Components	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.4648	3.0346	0.8662	0.8662
Comp2	0.4302	0.3652	0.1076	0.9737
Comp3	0.0650	0.0250	0.0163	0.9900
Comp4	0.0400	0.0000	0.0100	1.0000

Principal components (eigenvectors)

variable	Comp1	Comp2	Comp3	Comp4	Unexplained
LDF1	0.5237	0.1421	-0.7161	-0.4389	0.0000
LDF2	0.4587	0.7792	0.3101	0.2937	0.0000
LDF3	0.5022	-0.4948	-0.1551	0.6920	0.0000
LDF4	0.5129	-0.3575	0.6058	-0.4921	0.0000

Comp: Component variable ; **LDF1**: Logarithm of Liquid liabilities/GDP; **LDF2**: Logarithm of Bank assets of deposit money bank/GDP; **LDF3**: Logarithm of Claims of deposit money banks on private sector/GDP; **LDF4**: Logarithm of claims of other financial institutions on private sector /GDP.

The composite variable of financial development is a linear combination of original financial proxies. It aims to apprehend the overall reality of the financial sector. As shown in Table 3, the selected *Comp1* represents approximately 87% of the reality captured by the four financial variables previously mentioned.

The dummy variable represents the periods before and after the end of 1994 – end year of apartheid. Therefore, D_1 equals 0 until 1994, and D_1 equals 1 after 1994.

Data are obtained from different databases: economic performance data were retrieved from the World Development Indicators (2010) database, while financial data were obtained from the latest World Bank database constructed by Beck and Demirgüç – Kunt(1999) and revised in March 2010.

[5] Principal Component Analysis based on fours financial development variables: LDF1, LDF2, LDF3 and LDF4.

Since stationary time series are required for causality tests and in order to avoid spurious regressions (Foresti, 2007), stationary characteristics of all variables were analyzed. Augmented Dickey Fuller (ADF) test and Johansen test of cointegration are used to figure out order of integration of variables and long-run relationships between the GDP per capita and financial development proxies. One prior step before cointegration and causality tests is the determination of the number of lags variables to be used, and Vector Autoregression Regression (VAR) order selection criteria were used for that purpose.

Tab 4 : VAR Lag Order Selection Criteria (at 5% level)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	335.1896	NA	0.000	-16.0092	-15.7167	-15.9027
1	618.5712	456.1753	0.000	-27.4425	-25.102*	-26.5902
2	701.8461	105.617*	0.000*	-29.114*	-24.726	-27.516*

LR: sequential modified LR test statistic ; **FPE:** Final prediction error; **AIC:** Akaike information criterion; **SC:** Schwarz information criterion; **HQ**: Hannan-Quinn information criterion

Four over five criteria, in Table 4, suggest that the two lags would be sufficient for both the cointegration tests and causality tests. Tests' outcomes revealed a long-run relationship between bank assets and economic growth, and a co-integration relationship of all variables comprised in equation (2). Thus using log values would eschew spurious regressions.

In fact, estimation outcomes of equation (2) presented in Table 5, reveals that only one variable is not significant-*The claim of other financial institutions on private sector*. However, the sole financial development indicator coming out with the expected sign is the *claims of money banks on private sector.* Ceteris paribus, its 1% increase would trigger, approximately 0.25% of economic growth. Moreover, the economic growth seems to be 0.3% higher after 1994. It can also be observed that both investment and government expenditure boost the

increase of GDP per capita: a 1% increase of government expenses boosts the GDP per capita by 0.11%, while a 1% Increase of GFCF augments the GDP per capita by 0.40%.

Table 5: Outcomes of equation (2)

Variable	Coefficient	Std. Error	t-Statistic
C	6.3540*	0.268262	23.68582
LDF1	-0.2807**	0.131696	-2.131343
LDF2	-0.0318**	0.014884	-2.136127
LDF3	0.2534**	0.111792	2.266408
LDF4	-0.0672	0.073587	-0.912565
LGOV	0.1156***	0.063713	1.815257
LGFCF	0.4024*	0.046945	8.570452
D1	0.2980****	0.102338	2.911514

* Significant at 1%, ** significant at 5%, *** significant at 10%. **LDF1**: Logarithm of Liquid liabilities/GDP; **LDF2**: Logarithm of Bank assets of deposit money bank/GDP; **LDF3**: Logarithm of Claims of deposit money banks on private sector/GDP; **LDF4**: Logarithm of claims of other financial institutions on private sector /GDP; **LGOV**: Logarithm of government expenditure/GDP; **LGFCF**: Logarithm of Gross fixed capital formation/GDP

Striving to capture better the financial development, based on outcomes of equation (2) presented in Table 6, another composite variable was constructed using only variables with significant coefficients (LDF1, LDF2, and LDF3). Results of the Principal component analysis method used for that purpose are presented in Table 6.

Table 6 : Principal Component Analysis[6]

Rotation: (unrotated=principal)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp13	2.5873	2.2245	0.8624	0.8624
Comp23	0.3629	0.3130	0.1210	0.9834
Comp33	0.0498	0.0000	0.0166	1.0000

Principal components (eigenvectors)

variable	Comp13	Comp23	Comp33	Unexplained
LDF1	0.6119	-0.0203	-0.7907	0.0000
LDF2	0.5571	0.7207	0.4126	0.0000
LDF3	0.5614	-0.6930	0.4523	0.0000

Based on cumulative proportion of representation, *Comp13* reflects more than 86% of the reality captured by all the variables (LDF1, LDF2, and LDF3). Therefore it can be selected to represent the entire sector.

Then, the pairwise Granger causality test was used to identify the direction of causality between economic growth and each financial development proxy. The latter unveils, as shown in Table 7, a unidirectional causality from economic growth to *Claims of Deposit Money Banks on Private Sector*. Since the latter don't take into account the public sector, and the informal financial sector of South Africa (Simon, and Birch, 1992). Thus, the *Claims of Deposit Money Banks on Private Sector* caused by the economic growth reflects partially the financial development within the economy.

[6] Principal Component Analysis based on three financial development variables that are statistically significant in equation (2) : **LDF1**: Logarithm of Liquid liabilities/GDP; **LDF2**: Logarithm of Bank assets of deposit money bank/GDP; **LDF3**: Logarithm of Claims of deposit money banks on private sector/GDP.

Table 7: Pairwise Granger Causality Tests[7]

Null Hypothesis:	F-Stat.	Prob.	Decision
D(LDF1) does not Granger Cause D(LY)	0.03699	0.9637	NO
D(LY) does not Granger Cause D(LDF1)	0.93467	0.4023	NO
D(LDF3) does not Granger Cause D(LY)	1.65504	0.2057	NO
D(LY) does not Granger Cause D(LDF3)	4.53624	0.0177	YES 5 %
D(LDF4) does not Granger Cause D(LY)	0.07997	0.9233	NO
D(LY) does not Granger Cause D(LDF4)	0.35255	0.7054	NO
COMP1 does not Granger Cause D(LY)	1.28879	0.2884	NO
D(LY) does not Granger Cause COMP1	0.90025	0.4157	NO
COMP13 does not Granger Cause D(LY)	1.13494	0.333	NO
D(LY) does not Granger Cause COMP13	1.19469	0.3148	NO

However, the co-integration relationship between GDP per capita and the ratio of bank assets over the GDP (LDF2) suggested by the Johansen test requires the application of the VECM mechanism. Doing so will make possible to know whether, behind of that long-run relationship, there is a short-run causality or a long-run causality between the two variables. Taking into account the two lags recommended in by criteria in Table 4, outcomes of equation (8) and (9) are respectively presented in Table 8 and Table 9. Only α_1 is significant in Table 8, while the error term coefficient and remaining coefficients are insignificant.

[7] D stands for first difference in table 7, **LDF1** for Logarithm of Liquid liabilities/GDP; **LDF2** for Logarithm of Bank assets of deposit money bank/GDP; **LDF3** for Logarithm of Claims of deposit money banks on private sector/GDP; and **LDF4** for Logarithm of claims of other financial institutions on private sector /GDP.

Table 8: VECM , regression LY on LDF2

	Coefficient	Std Er.	t-Stat.	Prob.
$\boldsymbol{\delta_1}$	-0.01461	0.058355	-0.25036	0.8038
α_1	0.518024	0.177187	2.923604	0.0061
α_2	-0.0111	0.180114	-0.0616	0.9512
β_1	-0.00199	0.007882	-0.25197	0.8026
β_2	-0.00779	0.007832	-0.99397	0.3273
C	0.001557	0.001655	0.941254	0.3532

It can then be concluded that there is no long-run causality from bank assets to economic growth. On the contrary, Wald statistic test, presented in Table 10, suggest a short-run causality from Bank assets to Economic growth. However analysis of the causality from Economic growth to Bank assets presented in Table 9 assert the existence of a long-run causality from economic growth to bank assets, while the Wald test suggests the absence of any short-run causality.

Table 9 : VECM regress LDF2 on LY

	Coefficient	Std Er.	t-Stat	Prob.
$\boldsymbol{\delta_2}$	-0.20029	0.05824	-3.4391	0.0016
$\boldsymbol{\gamma_1}$	-0.02342	0.148351	-0.15787	0.8755
$\boldsymbol{\gamma_2}$	0.013064	0.147412	0.088621	0.9299
$\boldsymbol{\lambda_1}$	5.770701	3.334968	1.730362	0.0926
$\boldsymbol{\lambda_2}$	4.15493	3.390061	1.225621	0.2288
C	-0.01299	0.031141	-0.41726	0.6791

Specifically, the Wald test below shows that all short-run coefficients together are significant in the case of causality from Economic growth to bank assets, while the null hypothesis is accepted in the opposite case, suggesting that there is no short-run causality from bank assets to economic growth.

Table 10 : Wald test outcomes

	Null Hypothesis	chi-square	Prob	Decision
VECM (LY on LDF2)	$\beta_1 = \beta_2 = 0$	1.058372	0.5891	Accept H0
VECM (LDF2 on LY)	$\boldsymbol{\lambda_1} = \boldsymbol{\lambda_2} = 0$	6.503248	0.0387	Reject Ho

The checking of efficiency of VECM outcomes was done through the ARCH heteroscedasticity test, the Breusch-Godfrey Serial Correlation LM Test, and the residual normality test. Fortunately, as desired, when applied on VECM model which has unveiled long-run and short-run causality from Economic Growth to Bank Assets, these tests revealed that there is no serial correlation, there is no ARCH effect and the residual terms are normally distributed.

CHAPTER 3

CONCLUSIONS AND RECOMMANDATIONS

The knowledge about the direction of causality between economic activities and financial sectors is crucial. A clear understanding of this allows policy makers to design macroeconomic policies aiming to foster economic growth and financial development. The existing literature does not have a consensus about the direction of causality between financial development and economic growth. Moreover, Dimitris and Efthymos (2004) posit that studies using pooled data confirm the supply leading hypothesis, where financial development causes the economic growth , while time series data indicate the prevalence of the demand following hypothesis, where the economic growth causes the financial development. This paper contributes to the existing literature by analyzing the data of a specific country: South Africa. Our results suggest that economic growth causes financial development in South Africa. Specifically, the Granger causality test confirms the demand following hypothesis between *claims of deposit money banks on private sector*/GDP and economic growth, and the VECM applied to co-integrated variables (Real GDP and *Bank assets of deposit money bank*/GDP) reveals the existence of both short-run and long-run causality from economic growth to bank assets. Since empirical outcomes seem to uphold the predominance of demand following hypothesis in South Africa, a boom of economic activities would be the important driving force behind the improvement of financial sectors.

For a number of variables representing financial development, we found inconclusive evidence regarding the causality between financial development and economic growth. Calderon and Liu (2003) argued that it takes a considerable time for financial development to

have an impact on economic growth and we believe that more research is wanted in this area. Keeping these shortcomings in mind, we can still argue the existing data yield the direction of causality from economic growth to financial development in South Africa.

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APPENDICES

APPENDIX A- EFFICIENCY TESTS OF THE VECM OUTCOMES (EQUATION 7)

Heteroskedasticity Test: ARCH

F-statistic	1.98525	Prob. F(2,35)	0.1525
Obs*R-squared	3.87162	Prob. Chi-Square(2)	0.1443

Variable	Coefficier	Std. Error	t-Statistic	Prob.
C	5.17E-05	2.53E-05	2.04521	0.0484
RESID^2(-1)	0.254976	0.168382	1.514275	0.1389
RESID^2(-2)	0.132417	0.167853	0.788885	0.4355

R-squared	0.101885	Mean dependent var	8.47E-05
Adjusted R-squared	0.050564	S.D. dependent var	0.000119
S.E. of regression	0.000116	Akaike info criterion	-15.2169
Sum squared resid	4.68E-07	Schwarz criterion	-15.0876
Log likelihood	292.1206	Hannan-Quinn criter.	-15.1709
F-statistic	1.98525	Durbin-Watson stat	1.997288
Prob(F-statistic)	0.152515		

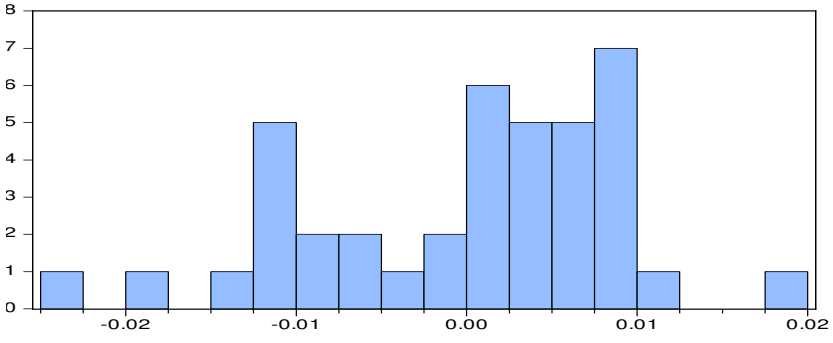
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.699351	Prob. F(2,32)	0.5043
Obs*R-squared	1.675158	Prob. Chi-Square(2)	0.4328

Variable	Coefficier	Std. Error	t-Statistic	Prob.
C(1)	0.000771	0.059276	0.013009	0.9897
C(2)	0.734452	0.951896	0.771568	0.446
C(3)	-0.10915	0.496027	-0.22005	0.8272
C(4)	-0.00115	0.008017	-0.143417	0.8869
C(5)	0.000486	0.008185	0.05934	0.9531
C(6)	-0.00175	0.002325	-0.753929	0.4564
RESID(-1)	-0.75865	0.972652	-0.779976	0.4411
RESID(-2)	-0.34151	0.326152	-1.047097	0.3029

R-squared	0.041879	Mean dependent var	-6.16E-18
Adjusted R-squared	-0.16771	S.D. dependent var	0.009158
S.E. of regression	0.009896	Akaike info criterion	-6.21655
Sum squared resid	0.003134	Schwarz criterion	-5.87878
Log likelihood	132.3311	Hannan-Quinn criter.	-6.09442
F-statistic	0.199815	Durbin-Watson stat	1.981494
Prob(F-statistic)	0.983222		

Residual Normality test



APPENDIX B-EFFICIENCY TESTS OF THE VECM OUTCOMES (EQUATION 8)

Heteroskedasticity Test: ARCH

F-statistic	0.010114	Prob. F(2,35)	0.9899
Obs*R-squared	0.021949	Prob. Chi-Square(2)	0.9891

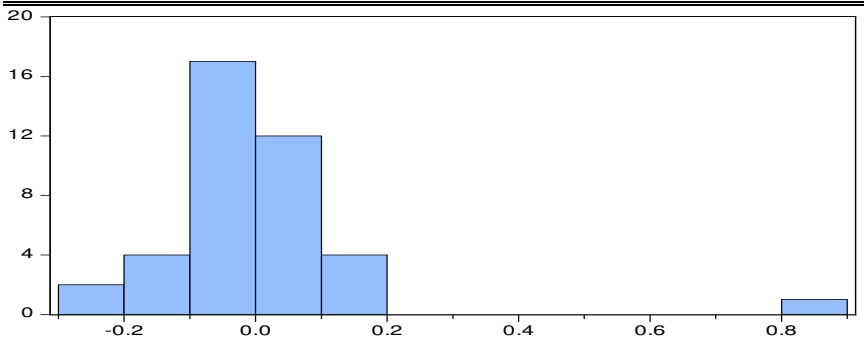
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.028594	0.022194	1.288358	0.2061
RESID^2(-1)	-0.00551	0.169011	-0.032602	0.9742
RESID^2(-2)	-0.023386	0.168655	-0.138659	0.8905
R-squared	0.000578	Mean dependent var		0.027736
Adjusted R-squared	-0.056532	S.D. dependent var		0.126396
S.E. of regression	0.129919	Akaike info criterion		-1.168148
Sum squared resid	0.590767	Schwarz criterion		-1.038865
Log likelihood	25.19482	Hannan-Quinn criter.		-1.12215
F-statistic	0.010114	Durbin-Watson stat		2.001558
Prob(F-statistic)	0.98994			

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.555695	Prob. F(2,32)	0.5791
Obs*R-squared	1.342608	Prob. Chi-Square(2)	0.511

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.063479	0.091597	0.693022	0.4933
C(2)	0.600654	0.589317	1.019236	0.3157
C(3)	-0.272319	0.424122	-0.642076	0.5254
C(4)	-1.290322	3.66391	-0.352171	0.727
C(5)	-2.292716	4.287193	-0.534783	0.5965
C(6)	0.004937	0.031923	0.154652	0.8781
RESID(-1)	-0.692927	0.662292	-1.046255	0.3033
RESID(-2)	0.363591	0.530326	0.6856	0.4979
R-squared	0.033565	Mean dependent var		-2.52E-15
Adjusted R-squared	-0.177842	S.D. dependent var		0.172363
S.E. of regression	0.187063	Akaike info criterion		-0.337884
Sum squared resid	1.119764	Schwarz criterion		-0.000108
Log likelihood	14.75769	Hannan-Quinn criter.		-0.215755
F-statistic	0.15877	Durbin-Watson stat		2.02773
Prob(F-statistic)	0.991474			

Residual Normality test



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